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THE MEANINGS IN MAKING: INCLUSION, OPENNESS, TECHNOLOGY

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Submitted:

Abstract

Inclusive music practices utilize digital musical instruments and interfaces to enable participation for people with disabilities to music making. Advances in personalized, open source technologies and low-cost DIY components have meant that bespoke, customized musical tools are easily accessible for inclusive music making. I discuss my own inclusive music research and the meanings in making and using digital musical tools. **Keywords:** inclusive music, openness, DIY, critical making

The barriers to music making that people with disabilities face can be viewed through two predominant theoretical models: the medical model and the social model [1]. Through the lens of the social model of disability, the exclusionary designs of musical interfaces and non-inclusive social attitudes to music making are perceived as the disabling factor. The medical model on the other hand sees the disabling factor as a limitation or lack within the musicians themselves. Thus, the social model perspective naturally shifts the focus to enabling techniques and assistive technologies for transcending or transforming disabling barriers.

In 2014, I conducted a yearlong ethnographic study with The Drake Music Project Northern Ireland (DMNI), a charity that exists to enable people with disabilities to overcome disabling barriers to musical participation through digital interfaces (<http://www.drakemusicni.com/>). My methodology was participant observation, and so I trained with ten other Belfast based musicians to become a DMNI access music tutor, eventually progressing on to shadowing, before finally taking a lead tutor role in inclusive music workshops.

Access music tutors use a plethora of mainstream and specialist musical interfaces and devices; over the period of my fieldwork I have sought to understand the experiences and opinions of the musicians, the other facilitators and my self in relation to the tools and techniques of inclusive music.

Individuals creating artistic work in any medium have diverse and unique abilities and accordingly develop unique techniques and customizations of their tools that shape their work process and practice. Amongst disabled musicians the spread of these abilities and techniques can be especially broad [2]. Inclusive design emphasizes the creation

of technologies that consider the broadest spectrum of user abilities.

Inclusive music: practices and tools

Electronic musicians can potentially create new tools, patches or instruments for individual works, or configure software or adapt hardware in unique ways specific to each instance of performance. I do not suggest that instrument extension and modification is a new phenomena, rather the advent of electronic instruments and tools, particularly MIDI controllers, digital musical instruments (DMI) and programming languages for audio have made instrument design itself available to musicians and makers as a form of artistic expression [3]. In a similar vein, bespoke inclusive musical tools can be created, aiming to overcome specific barriers for individual musicians or user groups, or to be widely accessible tools for music and sound creation.

Brendan McCloskey [4] is an inclusive digital musical instrument designer and researcher who has worked for over 15 years both practically and as a researcher for the Drake Music Project Northern Ireland. Since 2011, at the University of Ulster, he co-developed an inclusive DMI for 3 specific musicians who have quadriplegic cerebral palsy, who also have some degree of upper limb motor capability. This collaboratively designed device is called inGrid [5], built from a matrix of 16 DIY force-sensing resistors (FSR), which control a physical modeling synthesis engine built in Max/MSP [6]. inGrid was created from the position of working with the unique abilities of three digital musicians who face disabling barriers to their participation in music making; creating the specifications of the digital instrument to suit their specific requirements.

Fig.1 inGrid hardware and software interface (© Koichi Samuels. Photo Brendan McCloskey)



The collaborative methodology of inGrid's creation emphasised 'participatory design and customised methods in the assessment of need and capability amongst the small group of physically disabled digital musicians. Interviews and discussions with the collaborating musicians were

followed by several stages of prototyping qualitatively assessed by the group. The feedback from these assessment stages then informed extensive technical revisions, thus the final design emerged through an extended circular process of collaborative testing, dialogue and prototype revision.

The outcome was a DMI suited to the collaborating musicians specific requirements. Instead of keys or buttons, inGrid has ports you can plug a finger into, so for a player who finds discrete hand movements and finger control challenging, the barrier is removed by enabling steady, fixed placement of fingers into the ports. Through this interaction paradigm, inGrid offers independent real-time expressive control of sonic shape, loudness, timbre, vibrato and resonance within a simple switch-targeting gesture.

The Meanings in Making

In electronic music practices, as with more traditional music forms, the ‘tools of the trade’ hold individual and social meanings that are inscribed in their making and performed in their usage. The design and making of inGrid exposed design limitations of conventional, mainstream controllers and DMIs, explored solutions to overcoming disabling barriers to music making and challenged common assumptions of the abilities of musicians with disabilities, in this case specifically for three collaborating digital musicians with quadriplegic cerebral palsy.

Matt Ratto [7] discusses how ‘making’ can supplement and extend critical reflection on the relations between digital technology and society. He defines his research experiments as ‘critical making’: a mode of materially productive engagement that is intended to bridge the gap between physical and conceptual exploration. Practices of creating and using inclusive DMIs likewise can be seen to at once to deconstruct conventional understandings of disability and also practically help enable those who face a barrier to participation in making music.

‘Openness’

A characteristic ‘openness’; the intrinsically modifiable, adaptable nature of certain contemporary music technologies makes them particularly useful in inclusive music settings. I use the term ‘open music technology’ loosely to encompass practices surrounding the customization of MIDI controllers, hardware hacking and DIY/maker cultures in experimental music, and music and digital media programming languages (Max/MSP and Supercollider are examples the most widely proliferated). A recently published study into accessible design titled *Enabling Technology* [8], identifies that open source

hardware, such as Arduino and Raspberry Pi, and ‘curated ecosystems’, such as iOS and Android, also afford enormous versatility and customization needed by people with disabilities.

In designs that aspire for inclusion, systems where the interfacing between the musician and the generation of sound can be adapted or easily customized for an individual user offer significant benefits over traditional, un-modifiable instruments [9.] Open music technologies are more suited to musicians with disabilities because the interface or sensor can be appropriately matched to an individual musician’s specific barriers to access and participation.

Recent studies into DIY and maker culture document a growing interest in devices that have been developed and manufactured by individuals or communities of makers rather than by commercial industries [10, 11, 12, 13]. Research highlights the democratization of technology and material culture, alternative values, and a return to an interest in physical materials. This is attributed to low cost components and open source technology [14, 15]

Jewell and Atkin [16] note that open source can eliminate the need for a manufacturer, investment or both, and also that designs in the public domain can be used and manufactured by others. Their study, which was both ethnographic and design based, noted that people with disabilities who are not affiliated to any sort of institution often find it difficult to gain access to potentially beneficial technologies [17].

Concurring with their findings, during my fieldwork with the Drake Music Project Northern Ireland, I have experienced that although bespoke interfacing solutions can easily be created from scratch and existing devices could be hacked or modified to suit a specific individual prior to workshop contact time, a more immediate and emergent approach is usually employed. Facilitator and musician together use many existing interfaces in workshops, both mainstream and accessible, giving the musicians themselves the opportunity to discover the most appropriate control interface for their own specific abilities and preference. When a workshop participant does want to use a DMI/tool with an interface they find challenging it can often be temporarily adapted (rather than permanently hacked or modified), on the fly with additional controllers. For example using a MIDI keyboard and iRig MIDI interface [18] to input into an iPad (<http://www.apple.com/uk/ipad/>) or connecting assistive music technology devices, for example the Soundbeam [19], an ultrasonic sensor, which converts physical movements into MIDI data, removing the necessity of a tangible interface to hold or touch.

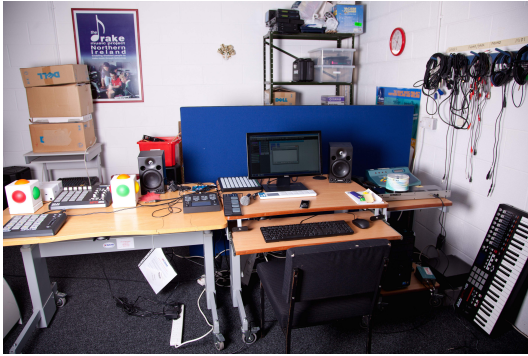


Fig. 2 A DMNI workshops space (© Koichi Samuels)

Sometimes much simpler solutions are implemented. For example, to enable live percussion play, a drumstick can be adapted by fixing an object with a larger surface area to the end, making it require less physical force from the musician to strike the drum. These kinds of solutions require creativity, improvisation and flexibility from both access music tutor and musician and create a space in workshops for improvisations of enabling techniques, performances of music and performances of ability.

Yet, it is important to note that in all cases it is the trained access music tutor implementing the hack, or adapting a tool for the musician's use. Thus an important question to ask when considering openness is: open to whom? Whether in inclusive music or for any other purpose, a precondition for the person hacking or adapting a tool is a certain level expertise; thus, a universally open technology is hard to conceive.

Technology and Inclusion

Nevertheless, the potential of open music technologies for customizations and tailored specifications to suit an individual's specific abilities is undeniable. Whether they come from within universities or third sector initiatives, organizations like The Drake Music Project Northern Ireland are growing in number, as is their reach and impact for musicians with disabilities in the UK. Jewell and Atkin [20] assert that The Paraorchestra [21] an organization made up of adult professional traditional and digital musicians who have a disability, provides a fertile environment for its members to exchange information about enabling music technology and collaborate in the creation of new instruments.

Through my experiences in the field it has become impressed upon to not solely concentrate on the abstract concern that many open technologies are not universally so. Rather as Jewell and Atkin emphasise, a focus on the opportunities that exist to extend the manner of

collaboration and sharing of information exemplified by the Paraorchestra, is necessary to understand and promote useful devices and software, how they can best be configured and potentially how to make new, more accessible open source technology.

Conclusion

Openness, transparency and intelligibility are all fundamental themes when thinking about electronic music. In inclusive music practices these hold particular relevance and are important to discuss and interrogate. At the same time, it is vital not to lose the essential ethos of inclusion itself. As an academic researcher, electronic musician and hardware enthusiast I am aware of my own personal interests and concerns. These come to bear when analyzing a device's level of openness; in the questions of who has access, and how intelligible and transparent work processes are to users and audiences. I do not suggest that these are not important considerations, certainly they lead to contiguous questions related to participation, collaboration and agency, but perhaps they are most valuably posed within the context of academic research. To the workshop participants and the access music tutors of The Drake Music Project Northern Ireland, concerns with the politics of digital music technology making and practices of use take a back seat when compared to the primary purpose and object of the workshops; for participants to collaborate in composing and performing music, and for facilitators to aid the process of striving to overcome disabling barriers and enable creativity.

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